Fluoroscopy involves injecting a radio-opaque dye during the procedure to allow X-ray control of the needle placement.

The dye is believed by medical practitioners to be non-toxic and harmless; however, it must be stressed that the same was true for Conray 280, previously used for fluoroscopy including in myelography, but was withdrawn from that use due to its high toxicity.

Dr. Michael Whitworth, a pain specialist in the States: has commented, in private correspondence ([i]),

"There has been a significant accumulation of literature from improved studies over the past 15 years indicating interlaminar epidural steroids* are ineffective in the treatment of lumbar radiculopathy, herniated discs, low back pain, spinal stenosis, and did not prevent surgical intervention." (*the commonest method currently used)

"In addition, studies have shown without fluoroscopic guidance there is evidence that even in experienced hands: 8-30% of interlaminar needles are misplaced outside the epidural space, over 50% of the time the wrong interspace is entered, and even if the needle is placed in the epidural space, 74% of the time the steroid fails to reach the target nerve root"

"Studies have demonstrated accurate placement by experienced physicians in only 61% of the time without fluoroscopy. Therefore, at least a 39% failure rate is guaranteed."

"1,600 members of the International Spinal Injection Society have abandoned this

technique and instead use fluoroscopically guided transforaminal steroid injections."

Fredman et al published a paper in February of 1999 ([ii]) in which they concluded that in cases of "failed back surgery syndrome" (for which ESIs are often used) "surface anatomy is unreliable and may result in inaccurate steroid placement.

Finally, despite accurate placement, the depot-steroid solution will spread to reach the level of pathology in only 26% of cases."

Renfrew et al, published their study in 1999([iii]), and concluded that "fluoroscopy is essential for correct placement of epidural steroid injection."

The State of Colorado Invasive Treatment Procedures 1998 states ([iv]): "Fluoroscopic, arthrographic and/or CT guidance during the above procedures (includes ESIs and other nerve blocks) is required to document technique and needle placement."

Fluoroscopic techniques therefore seem to potentially increase the success rate, and reduce the chance of intrathecal injection, but this fails to address the issue of neurotoxicity, both of the steroid preparations themselves, the local anaesthetic agents given AND the fluoroscopic dye.

One article ([v]) suggests that intrathecal fluorescein (used in myelography) may cause complications such as lower extremity weakness, numbness, generalised seizures, opisthotonus and cranial nerve deficit.

This is a factor one must consider about the fluoroscopic dye itself: practitioners who use it assume it is safe, but data is lacking to allow confidence on this issue.

[i] Whitworth M, private correspondence, reproduced with his permission. 2000.

[ii] Fredman B, Nun MB, Zohar E, Iraqi G, Shapiro M, Gepstein R, Jedeikin R, *Anesth Analg* 19 99 Feb;88(2):367-72 Epidural steroids for treating "failed back surgery syndrome": is fluoroscopy really necessary?

[iii] Renfrew DL, Moore TE, Kathol MH, el-Khoury GY, Lemke JH, Walker CW *AJNR (Am J Neuroradiol)*
1991 Sep-Oct;12(5):1003-7 Correct placement of epidural steroid injections; fluoroscopic guidance and contrast administration.

[iv] Internet resource: State of Colorado guidelines: http://workerscomp.cdle.state.co.us/Rules/exFsection4.htm

[v] Moseley JI, Carton CA, Stern WE *J Neurosurg* 1978 May; 48(5):765-7 Spectrum of complications in the use of intrathecal fluorescein.